DOCUMENT RESUME

ED 462 347 SO 033 588

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TITLE	Alexander Graham Bell's Patent for the Telephone and Thomas Edison's Patent for the Electric Lamp. The Constitution Community: The Development of the Industrial United States (1870-1900).
INSTITUTION	National Archives and Records Administration, Washington, DC.
PUB DATE	2001-00-00
NOTE	12p.; For related lesson plans, see SO 033 572-575 and SO 033 581-587.
AVAILABLE FROM	National Archives and Records Administration, 700 Pennsylvania Avenue, N.W., Washington, DC 20408. Tel: 866-325-7208; e-mail: inquire@nara.gov. For full text: http://www.nara.gov/education/cc/main.html.
PUB TYPE	Guides - Classroom - Teacher (052)
EDRS PRICE	MF01/PC01 Plus Postage.
DESCRIPTORS	*Government Role; *Industrialization; *Inventions; *Patents; Primary Sources; Secondary Education; Social Studies; *United States History
IDENTIFIERS	*Bell (Alexander Graham); *Edison (Thomas); National Civics and Government Standards; National History Standards; United States Constitution

ABSTRACT

In 1876 Americans held a Centennial Exhibition in Philadelphia (Pennsylvania) to celebrate the nation's birth 100 years earlier. Machinery Hall drew the most admiration and wonder. Alexander Graham Bell exhibited the first telephone, and Thomas Alva Edison presented the automatic telegraph, one of more than 1,000 inventions he would patent in his lifetime. When the U.S. government granted Edison and Bell their patents, it put them at a distinct advantage over their competitors. They alone were given the right to profit from their inventions for a specified time period. This lesson discusses the power of Congress to pass laws related to the granting of patents (Article I, Section 8, Clause 8). The lesson correlates to the National History Standards and to the National Standards for Civics and Government. It furnishes as primary source documents Alexander Graham Bell's telephone patent drawing and oath and Thomas Edison's electric lamp patent drawing and claim. The lesson gives the historical background of the beginnings of industrialization in the United States, as well as biographical sketches of Bell and Edison and lists five resources. It provides eight diverse teaching activities for implementation in the classroom, including document analysis, analyzing effects, a timeline of U.S. inventions, a simulation of creating a corporation, and research and compare exercises. (BT)

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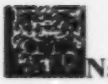

National Archives and Records Administration

THE CONSTITUTION COMMUNITY

The Development of the Industrial United States (1870-1900)

Alexander Graham Bell's Patent for the Telephone and Thomas Edison's Patent for the Electric Lamp

By Joan Brodsky Schur

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2001

The Constitution Community is a partnership between classroom teachers and education specialists from the National Archives and Records Administration. We are developing lessons and activities that address constitutional issues, correlate to national academic standards, and encourage the analysis of primary source documents. The lessons that have been developed are arranged according to historical era.

SO 033 588

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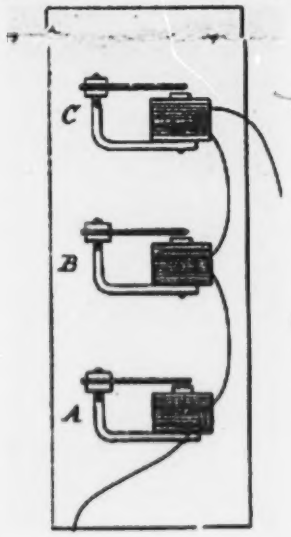


Alexander Graham Bell's Patent for the Telephone and Thomas Edison's Patent for the Electric Lamp

Constitutional Connection

This lesson relates to the power of Congress to pass laws related to the granting of patents (Article I, Section 8, Clause 8).

This lesson correlates to the National History Standards.

Era 6 -The Development of the Industrial United States (1870-1900)

- **Standard 1A** -Demonstrate understanding of the connections among industrialization, the advent of the modern corporation, and material well-being.

This lesson correlates to the National Standards for Civics and Government.

Standard V.B.3 -Evaluate, take, and defend positions on issues regarding economic rights
. . . including the right to establish and operate a business, copyright, and patent.

Cross-curricular Connections

Share this exercise with your colleagues in history, government, language arts, and science.

List of Documents

1. Alexander Graham Bell's Telephone Patent Drawing and Oath (oath, drawing)

2. Thomas Edison's Electric Lamp Patent Drawing and Claim (claim, drawing)

Historical Background

In 1876 Americans held a Centennial Exhibition in Philadelphia to celebrate the nation's birth 100 years earlier. It was the first world's fair to be held in the United States, and it announced for all to see that the nation had come of age as an industrial power. Over 8 million Americans attended, many traveling the railways that now spanned the continent. Of all the exhibition buildings, Machinery Hall drew the most admiration and wonder. Its displays were powered by the world's largest steam engine. Inside, inventions by two of America's greatest inventors were on display. Alexander Graham Bell exhibited the first telephone, and Thomas Alva Edison presented the automatic telegraph, one of more than 1,000 inventions he would patent in his lifetime. Together their inventions changed American life in ways that still affect us today.

Alexander Graham Bell

Alexander Graham Bell (1847-1922) was born in Scotland and moved to Boston in 1872 to open a school for teachers of the deaf. He became a U.S. citizen in 1882. His early experiments included ways to improve and use telegraphy. The telegraph conveyed messages through a system of electrical sounds that, when decoded, could be translated into words. It was dependent on skilled technicians and never became a home appliance. Rather, it required you to go to a telegraph office to send or receive a message, or perhaps a messenger did this for you. Bell sought something revolutionary: to transmit not only the sound of the human voice, but audible words. With the telephone, Bell wrote in 1878, "It is possible to connect every man's house, office or factory with a central station, so as to give him direct communication with his neighbors."

Thomas Edison

Thomas Edison (1847-1931) was born in Ohio and grew up in Michigan. His formal education lasted at most four years, in part because his teachers complained that he asked too many questions. By age 12 he was a newsboy and candy seller on the railways. Working as a telegraph operator gave him some of his early lessons in the uses of electricity. Among Edison's many patents were ones for totally new inventions as well as those that dramatically improved the inventions of others. These included patents for the electric motor, motion picture projector, storage battery, Dictaphone, duplicating

machine, typewriter, and phonograph (his most original). But his most far-reaching achievement was his patent for improving the incandescent lightbulb.

Before the invention of the electric lightbulb, homes were lit by candle, kerosene-oil lamp, or gaslight. All flickered, were fire hazards, and emitted smoke and heat. Other inventors of the day were experimenting with a glass globe that, if emptied of air, could contain a light that would not burn out. But no one could find a suitable filament, or wire. The filament creates light when an electric current passes through it, but it must neither burn out quickly nor melt. Edison solved this problem by using carbonized cotton.

The Growth of the Corporation

A vision such as Bell's could not become a reality without enormous sources of capital (money) to mass-produce telephones, lay cables, and establish switchboards. Likewise the incandescent light was of little use until houses could be linked by electric wires to powerful generators.

Until the Industrial Revolution, a shop owner did not need to raise great sums of money to invest in expensive machinery. He probably made his goods by hand and sold them directly to the customer. He therefore did not need to advertise his goods far and wide. A business was usually the responsibility of one person, a proprietor, who hired others and accepted total financial responsibility if the venture went under. Partnerships were able to raise greater capital because two or more people pooled their money. But if their partnership failed, all the partners were personally liable; any assets they owned could be seized to pay their debts.

The Civil War gave impetus to many new industries on a scale never before seen in America. What was needed was a new way to fund them. The corporation solved the problem. Corporations are legal entities chartered by state governments. To establish a corporation, money is raised from many investors. Each investor then owns shares of the company, represented by the stock certificates the corporation issues to its shareholders. If the company earns a profit, the corporation will divide its profit with its investors and pay dividends. (The greater the number of shares you own, the greater your dividend.) The value of the corporation's stock will go up. But if the corporation fails, each investor will only lose what he or she invested.

When the U.S. government granted Edison and Bell their patents, it put them at a distinct advantage over their competitors. They and they alone were given the right to profit from their inventions for a specified time period (today it is 20 years). While both men were primarily inventors, not entrepreneurs, neither wasted time before either founding companies or granting their patent rights to others for manufacture. The Edison Electric Light Company was chartered in 1878 and led eventually to what we know as the General Electric Company. With his laboratory and many assistants at Menlo Park, New Jersey, Edison pioneered the establishment of the large research centers of today. The Bell Telephone Company was founded in 1877. In 1899 American Telephone and Telegraph (AT&T) became the parent company of the Bell System.

Corporations were not without their ill effects. They further distanced management from the workers, who did not share in the companies' profits as did stockholders. Left unregulated, huge corporations often ate up their smaller competition. By 1900 Bell Telephone had situated 800,000 phones in America, far more than any competitor. Long after Bell's patent expired, it had the edge in developing long-distance services, and it monopolized them. The Interstate Commerce Act (1877) and Sherman Anti-Trust Act (1890) were passed to ensure that competition among companies could continue to thrive.

Resources

Mackay, James. *Alexander Graham Bell: A Life* . New York: John Wiley & Sons, Inc., 1997. An up-to-date and scholarly account.

Silverberg, Robert. *Light for the World: Edison and the Power Industry* . Princeton, NJ: D. Van Nostrand Co., 1967. Especially good for the connection between invention and industry.

Twain, Mark. *The Autobiography of Mark Twain* . Edited by Charles Neider, New York: Harperperennial Library, 1959 (still in paper). See Chapter 45, which has a hilarious account of Twain's attempt to be an investor in new inventions, including the telephone.

Vries, Leonard de. *Victorian Inventions* . New York: American Heritage Press, 1971. A delightful pictorial account, including many fanciful ideas that were never marketed.

The Sound and the Silence . An excellent two-part video about the life of Alexander Graham Bell. Available from Turner Home Entertainment #6295.

Teaching Activities

Document Analysis

1. Provide each student with a photocopy of each of the featured documents, and make a transparency with the following questions: What types of documents are these? What are the dates of the documents? Who wrote the documents? What is the purpose of the documents? What information in the documents helps you understand why they were written? What can you deduce about the process of applying for a patent from these two documents? What makes them legal documents as opposed to merely personal requests? Why was a drawing a necessary part of the application process? Are the drawings done to scale? Why are parts of each invention numbered and lettered? Ask one student to read the documents aloud as the others read silently. Lead the class in oral responses to the questions.

2. Direct students to study Bell's patent drawing and determine what part of the telephone apparatus each letter in Bell's Figure 7 represents. Challenge students to do the research to find out whether they were correct.

Research and Compare

3. Bell and Edison led fascinating lives in tandem. At different points in time they even made improvements to each others' inventions! Divide students into pairs. Ask student A in each pair to read a short biographical account about Bell and student B about Edison. Ask each pair to exchange information and determine what qualities these inventors shared. Ask students if they think all inventors share these qualities.

Analyze Effects

4. Ask students to name all appliances in their homes that operate by electricity. Ask them to imagine one week in their lives without a telephone. Then, ask students to imagine how life was conducted differently in the early 19th century.

Next, using the following list of categories, lead a class discussion in which students brainstorm how the telephone and electric light changed life in the United States. Ask in what ways did each invention affect the following sectors:

a. Environment
b. Workplace
c. Home life
d. A previously existing industry
e. Creation of a new industry
f. Women
g. Social classes from poor to rich
h. Urban life and growth of cities
i. Rural life and farms
j. Leisure time and entertainment
k. Safety and health
l. Etiquette and social interaction
m. Warfare

A Timeline of U.S. Inventions

5. Post on your classroom wall a timeline dated from 1800 to the present. Set up groups of students to research the significant inventions patented during a specific time frame -- for example, assign a decade or quarter-century to groups of three. Students should be encouraged to use their school library resources as well as on-line resources. Ask each group to draw each invention it finds on one index card, and to write a description of its impact on another. All information can be tacked onto the timeline.

When the timeline is complete, ask the entire class to pick one invention in every quarter century that they think made the greatest overall impact. This should generate some lively debate.

Create a Corporation

6. Conduct a simulation to help students experience the steps necessary to create a corporation. First, discuss with students the differences between a proprietorship, a partnership, and a corporation. Second, divide the class into six small groups and ask each group to complete the following tasks:

a. Imagine an invention that will change our lives in the 21st century.
b. Draw it and write the specifications for it.
c. Explain how it will be manufactured and distributed.
d. Create an advertisement for it explaining its uses and desirability.
e. Decorate a box to be filled with investments by students in the other groups who wish to invest in the company that will manufacture your invention.

Third, give $500 of play money to each student (ten $50 bills). Tell them that they will be able to invest this money in any corporation except the one they have founded. Fourth, ask a representative from each corporation-group to present their product and plans to the class (the prospective investors). Fifth, set up a sale time where class members can invest their money. Direct students to "invest" by inserting the money they wish to invest into the appropriate box. Sixth, when the time to invest is over, count up the money collected in each box and report the amounts to the students. Finally, discuss with students why they invested where they did.

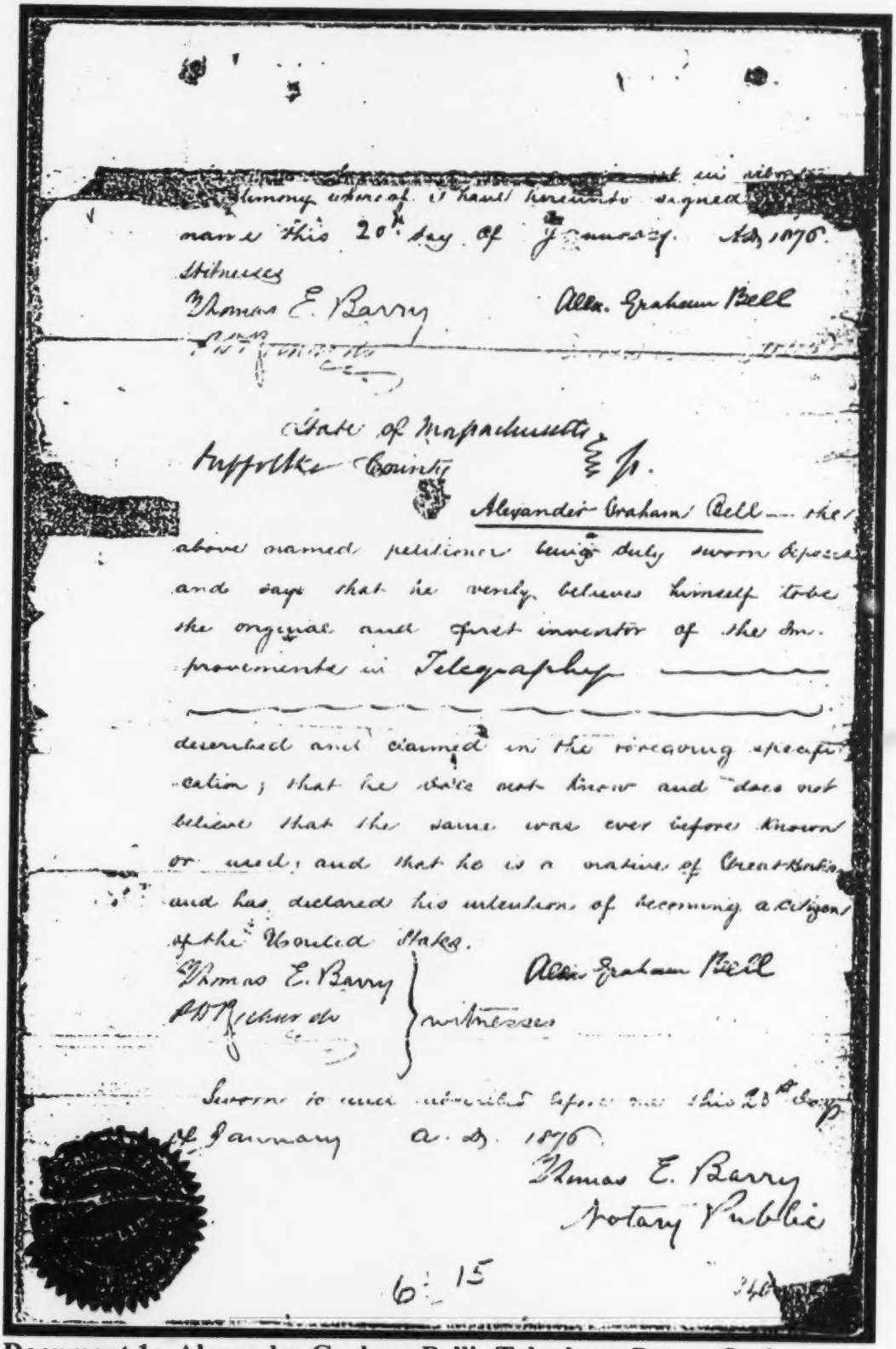
Research and Compare

7. Ask students to compare the breakup of AT&T in 1982 to the litigation for the late 1990s against Microsoft. Identify the sections of the Constitution and acts of Congress under which the suits were initiated. Ask students to evaluate the benefits of competition over universal and standardized service. When buying out its competitors for long-distance service, Bell Telephone claimed that the nation was better served by "one policy, one system, universal service." Ask students what claims Microsoft is now making in its defense?

8. Ask students to compare the management of public utilities in the United States and in a country whose government, rather than the private sector, is responsible for those services. Ask students to determine the advantages and disadvantages of each system.

The documents included in this project are from Record Group 241, Records of the Patent and Trademark Office. They are available online through the National Archives Information Locator (NAIL) <http://www.nara.gov/nara/nail.html> database, control numbers NWCTC-241-PATENT-174465 and NWCTC-241-PATENT-223898. NAIL is a searchable database that contains information about a wide variety of NARA holdings across the country. You can use NAIL to search record descriptions by keywords or topics and retrieve digital copies of selected textual documents, photographs, maps, and sound recordings related to thousands of topics.

This article was written by Joan Brodsky Schur, a teacher at Village Community School in New York, NY.



In testimony whereof I have hereunto signed my name this 20th day of January A.D. 1876.

Witnesses
Thomas E. Barry
Alex. Graham Bell

State of Massachusetts
Suffolk County } ss.

Alexander Graham Bell the above named petitioner being duly sworn deposes and says that he verily believes himself to be the original and first inventor of the improvements in Telegraphy described and claimed in the foregoing specification; that he does not know and does not believe that the same was ever before known or used; and that he is a native of Great Britain and has declared his intentions of becoming a citizen of the United States.

Thomas E. Barry
P.O. Reporter
} witnesses
Alex. Graham Bell

Sworn to and subscribed before me this 20th day of January A.D. 1876

Thomas E. Barry
Notary Public

6: 15

Document 1: Alexander Graham Bell's Telephone Patent Oath

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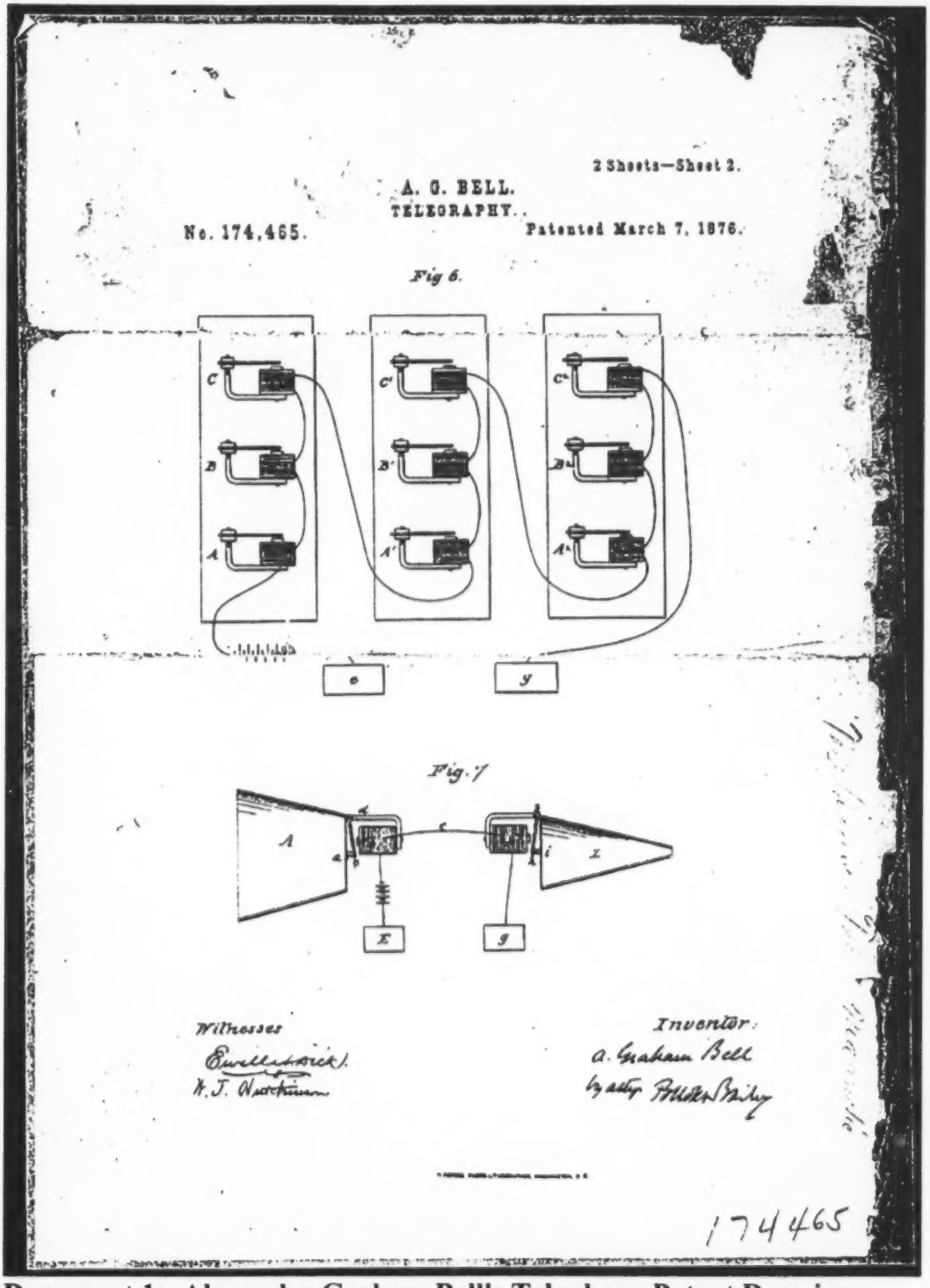


2 Sheets—Sheet 2.

A. G. BELL.

TELEGRAPHY.

No. 174,465. Patented March 7, 1876.

Fig 6.

C C' C'
B B' B'
A A' A'
e g

Fig. 7

A d c i I
E g

Witnesses
Ewell & Dorick
H. J. Newton

Inventor:
A. Graham Bell
by atty Pollock & Bailey

174465

Document 1: Alexander Graham Bell's Telephone Patent Drawing

To the Honorable Commissioner of Patents:

Your Petitioner Thomas A. Edison

of Menlo Park in the State of New Jersey

prays that LETTERS PATENT may be granted to him

for the invention of an Improvement in Electric Lamps and in the method of manufacturing the same

set forth in the annexed specification. (Case No. 186.)

And further pray that you will recognize LEMUEL W. SERRELL, of the City of New York, N. Y., as his Attorney, with full power of substitution and revocation, to prosecute this application, to make alterations and amendments therein, to receive the Patent, and to transact all business in the Patent Office connected therewith.

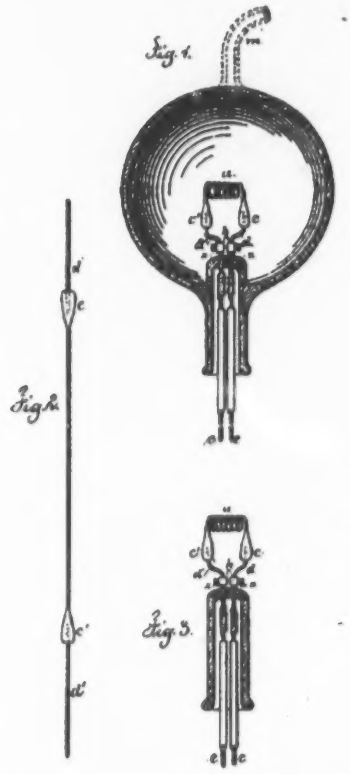
_____

_____ 1879.

Document 2: Thomas Edison's Electric Lamp Patent Claim

T. A. EDISON.
Electric-Lamp.

No. 223,898. Patented Jan. 27, 1880.



Witnesses
Chas. H. Smith
Geo. P. Pinkney

Inventor
Thomas A. Edison
for Lemuel W. Serrell
atty

Document 2: Thomas Edison's Electric Lamp Patent Drawing